

P E T I T I O N

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5 Your Petitioner, THOMAS P. GODFREY, a citizen of the United States and a
resident of the State of Nebraska, whose post office address is 12488 Woodcrest Drive,
Omaha, NE 68137, prays that Letters Patent may be granted to him for an

ANIMATED FIGURE

set forth in the following specification.

BACKGROUND OF THE INVENTION

10 The present invention relates to animated figures and more particularly to an
animated figure that incorporates the use of a plurality of cams and control rods to
impart fluid and natural movements to the appendages of the animated figure.

DESCRIPTION OF THE PRIOR ART

15 Animated figures are frequently used for indoor and outdoor displays relating to
various holidays, products, or simply for decoration. Typically, the animated figure is
provided with a body portion and at least one appendage, such as an arm, a head, or a
set of legs that moves with respect to the body portion. A motor is disposed within the
20 body portion and coupled to the appendage through a mechanical connection that
permits the appendage to move. However, regardless of their level of complexity, prior
art animated figures have failed to provide fluid and lifelike appendage movement.
Rather, the motion of the appendages on prior art animated figures appears mechanical
and fails to follow a natural range of motion.

1 U.S. Patent No. 4,177,602 discloses an automated figure that is provided with
movable leg members. The leg members are jointed at the knee and coupled to a body
portion at the "hip." A motor within the body portion rotates a cam member that is
connected to the leg, beneath the knee joint, by an elongated connecting rod. While
5 the rotating cam does move the leg in a generally forward walking motion, it lacks the
fluid, natural range of motion exhibited by the leg of an animal or a person. No joint is
provided at the "ankle" of the leg, and the required engagement of the connecting rod
between a pair of fulcrum pins creates a mechanical and somewhat clumsy motion.

10 U.S. Patent No. 61,416 discloses an automatic toy in the shape of a horse. The
toy is provided with a simple wind-up motor that is geared to extend and retract a
plurality of pivotably coupled bars that extend through the length of each leg member.
Each leg is comprised of an upper leg portion, lower leg portion, and a hoof. Both the
upper and lower leg portions are provided with a pair of the rods, which are pivotably
15 linked to one another at their end portions. Each of the joints in the leg members are
provided with at least three pivot points that enable the joints to bend. Accordingly, as
the motor operates in a forward direction, the legs are extended and retracted in a
gimping motion. However, the motion attained by the skeleton of pivotably linked bars
is machinelike and limited in its range of motion. Moreover, the assembly of such a
20 jointed skeletal system is fairly complex and is susceptible to frequent mechanical
failures due to the intricate structure.

25 Accordingly, what is needed is an improved system and method for providing an
animated figure with fluid and natural appendage movement.

SUMMARY OF THE INVENTION

1 The animated figure of the present invention is generally provided with at least
one jointed appendage, which is pivotably coupled to a body portion. A motor is
provided within the animated figure and selectively rotates a shaft, which is positioned
5 adjacent the appendage. A first cam is coupled to a follower groove within the
appendage so that the appendage will pivot with respect to the body when the shaft is
rotated. In a preferred embodiment, a first control rod is pivotably coupled to the first
cam at one end and pivotably coupled at its other end to the appendage adjacent the
10 joint. Accordingly, as the first cam rotates and the appendage pivots, the control rod
bends the appendage at the joint. In another embodiment, a second joint can be
provided within the appendage to serve as an "ankle" or "wrist" of the appendage. A
second control rod may be coupled to the appendage adjacent the first and second
joints. In this configuration, when the first joint bends, the second joint will bend.

15 The animated figure of the present invention can be provided with pairs of
appendages and, where a four-legged animal is to be portrayed, forward and rearward
pairs of appendages can be provided. Each of the appendages can be provided with
one or more joints and control rods to move in response to the rotation of a cam in the
20 same manner as the previously described appendage. The motion of each of the
separate appendages can be mechanically timed with one another to provide the
appearance of the independently-moving appendages of any two- or four-legged figure.
Moreover, this same structural design could be provided to create moving "arms" for the
animated figure.

1 In still another embodiment, neck and head portions are provided to the
animated figure and are pivotably coupled to one another and the body. An eccentric
cam secured to the shaft imparts forward and rearward motion to the neck. A control
rod, which is coupled to the neck and head portions, pivots the head as the neck pivots.
5 This provides the appearance of independent head and neck movement while the
animated figure is in motion.

Accordingly, one of the principal objects of the present invention is to provide an
animated figure having one or more appendages that move in a fluid and natural
manner with respect to the body of the figure.

10 A further object of the present invention is to provide an animated figure having a
plurality of appendages that fluidly and naturally move in concert with one another to
emulate the natural motion of a two- or four-legged figure.

Still another object of the present invention is to provide an animated figure with
15 neck and head portions that move naturally in concert with one or more appendages of
the figure.

Yet another object of the present invention is to provide an animated figure that
displays fluid and natural movement characteristic of the particular animal or person
that the figure is emulating.

20 A further object of the present invention is to provide an animated figure that
utilizes at least one cam and at least one control rod to provide fluid and natural motion
to an appendage of the figure.

1 Still another object of the present invention is to provide an animated figure
having a simple and durable structural design that exhibits fluid and natural appendage
movement.

5 These and other objects of the present invention will be clear to those of skill in
the art.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of one embodiment of the animated figure of the
present invention;

Figure 2 is a side elevation view of the animated figure of Figure 1;

10 Figure 3 is a side elevation view of the animated figure of Figure 1 demonstrating
some of the fluid and natural appendage movements that can be obtained with the
depicted embodiment;

15 Figure 4 is a partial side view of the head and neck portions of one embodiment
of the present invention demonstrating some of the fluid and natural movements that
can be obtained with the depicted embodiment; and

20 Figure 5 is a partial side view of an appendage of one embodiment of the
present invention demonstrating some of the fluid and natural movements that can be
obtained with the depicted embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENT

25 The animated figure 10 of the present invention is generally depicted in Figures
1-5. Although the animated figure 10 is depicted as being a four-legged animal, it is
contemplated that the inventive concepts of the present invention will be equally

1 applicable to the creation of two-legged figures, figures with arms and legs, figures with
moving neck and head portions, and any desired combination of such body parts. For
purposes of conciseness, however, the animated figure 10 of the present invention will
be generally described as being a four-legged animal.

5 The animated figure 10 is generally provided with a body frame 12, which may
further incorporate one or more body plates 14. At least one appendage 16, such as a
leg, arm, neck, head or tail, will be pivotably coupled to the body frame 12 and/or body
plates 14. In the present example, the appendage 16 is a leg having an upper segment
10 18, which is pivotably coupled to a lower segment 20 at a first joint 22. The upper
segment 18 is pivotably coupled to the body plate 14 so that it may be selectively
pivoted in forward and rearward directions with respect to the body plate 14.

15 An axle 24 is rotatably coupled to the body frame 12 adjacent the upper segment
18 of the appendage 16. The axle 24 is selectively rotated with respect to the body
frame 12 by a motor 26. The motor 26 may be of any conventional type, including, but
not limited to, electrical, internal combustion, or a stored tension motor that uses a
spring that is manually wound with a key. It is further contemplated that the motor 26
could simply be manually operated through a crank or similar means when desired.
20 Regardless, the motor 26 is operatively coupled to the shaft 24 through a belt 28 and/or
a plurality of matable gear members. Accordingly, as the motor 26 is engaged,
rotational movement is imparted upon the axle 24.

25 A cam 30 is coupled to the axle 24 so that the cam 30 rotates with the axle 24.
Although the cam 30 is generally depicted as being round and disc-shaped, it will be

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apparent to those of skill in the art that the cam 30 may be provided in nearly any
shape, according to the given working parameters. A pin 32 is secured to the cam 30
so that the pin 32 extends outwardly therefrom. A generally elongated follower groove
34 is formed in the upper segment 18 of the appendage 16 and is preferably shaped to
5 at least partially receive a portion of the pin 32 therein. The follower channel 34 is
provided with opposite ends and a length extending therebetween, along which the pin
32 may freely travel. Accordingly, as the cam 30 is rotated, the pin 32 will travel along
the follower groove 34 while the pin 32 and cam 30 travel along their generally orbital
path. This action imparts a fluid and natural pivoting motion to the upper segment 18
10 about the pivot point 36. The characteristics of the pivoting motion can be easily
changed by the modification of the location, length and/or shape of the follower groove
34.

15 In a preferred embodiment, an upper control rod 38 is pivotably coupled at one
end to the pin 32 and is pivotably coupled to the lower segment 20 adjacent the joint 22
at its other end. Accordingly, as the pin 32 and cam 30 rotate, the upper control rod 38
will bend the appendage 16 at the joint 22. The proximity with which the upper control
rod 38 is coupled to the lower segment 20 adjacent the joint 22 will determine the
20 characteristics of the bending motion of the joint 22. Accordingly, a combination of the
pin 32 and follower groove 34 along with the upper control rod 38 impart a fluid and
natural movement to the appendage 16 at its pivot point 36 and the joint 22.

25 It may be desirable to include a third or bottom segment 40 to the appendage 16
to provide a hand, foot or hoof to the appendage 16. Preferably, the bottom segment

1 40 is pivotably coupled to the lower segment 20 at a second joint 42. Controlled
bending of the second joint 42 can be obtained by providing the appendage 16 with a
lower control rod 44 which is pivotably coupled to the upper segment 18 adjacent the
joint 22 at one end and pivotably coupled to the bottom segment 40 adjacent the
5 second joint 42. Accordingly, lower control rod 44 will work in concert with the upper
control rod 38 in response to the rotation of the cam 30 and the pin 32 to bend the
second joint 42 as the appendage 16 moves with respect to the body plate 14.

Where desired, an opposing appendage 16' can be provided opposite
appendage 16. The opposing appendage 16' is preferably constructed in much the
10 same manner as that described for appendage 16. Movement of the opposing
appendage 16' is at least partially provided through a second cam 30', which is coupled
to the shaft 24 opposite the first cam 30. The position of the cams 30 and 30' as they
are coupled to the shaft 24 can be selectively adjusted to time the movement of the
15 appendages 16 and 16' to provide a fluid and natural walking or running movement to
the animated figure 10.

Additional appendages may be also provided, such as the example of the rear
legs 46 and 46' depicted in Figures 1-3. It is preferred that the structure of the legs 46
and 46' be similar to one another. Accordingly, for purposes of conciseness, only the
20 leg 46 will be described herein. The leg 46 is preferably provided with at least an upper
segment 48 and a lower segment 50 and may be optionally provided with a third or
bottom segment 52. The upper segment 48 is pivotably coupled to the body plate 14 at
the point 54. A rear axle 56 is pivotably coupled with the body frame 12 and is
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operatively coupled to the motor 26 much in the same fashion as that described for axle
1 24. A third cam 58 is secured to the rear axle 56 so that it rotates therewith. A pin
member 60 extends outwardly from the third cam 58 and is at least partially received
by, and slidably movable within, a follower groove 62 formed in the upper section 48 of
5 the leg 46. The movement imparted to the upper segment 48 by the movement of the
pin 60 within the follower groove 62 is similar to that described previously for pin 32 and
the follower groove 34. An upper control rod 64 is coupled to the pin 60 and pivotably
coupled to the leg 46 adjacent a joint 66, which pivotably couples the upper segment 48
10 with the lower segment 50. Where a bottom segment 52 is provided, it is preferred that
a lower control rod 68 be coupled to the upper segment 48 adjacent the joint 66 at one
end and pivotably coupled to the bottom segment 52 adjacent a joint 70, which
pivotably couples the lower segment 50 with the bottom segment 52. It is preferred that
the cams that movably couple the legs 46 and 46' to the rear axle 56 be oriented to
15 time the movement of the legs 46 and 46' to impart a natural walking or running motion
to the same. Similarly, it is preferred that the movement of legs 46 and 46' be timed to
move in cooperation with the appendages 16 and 16' to further create the appearance
of a natural motion among the appendages. It is contemplated that, in the example
20 where a bipedal figure is desired, that the legs 46 and 46' will be timed to move in
cooperation with appendages 16 and 16', which might serve as the figure's arms.

The animated figure 10 may optionally be provided with a neck portion 72, which
is preferably pivotably coupled with the body frame 12 and/or the body plates 14 at a
pivot point 84. A head portion 74 may then be secured atop the neck portion 72. It is
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1 preferred that the head portion be pivotably coupled to the neck portion 72 so that the
two structures may pivot at least slightly with respect to one another. Motion may be
imparted to the neck portion 72 and the head portion 74 through a neck cam 76, which
is preferably secured to the axle 24 such that the neck cam 76 rotates therewith. As
5 the neck cam 76 rotates, it engages the lower end portion 78 of the neck portion 72 so
that the neck portion 72 pivots rearwardly and forwardly in response to such
engagement. It is contemplated that the shape of the neck cam 76 could be provided
to effectuate the desired rate and character of movement imparted upon the neck
portion 72. A neck control rod 80 is preferably provided and pivotably coupled at one
10 end to the body plate 14 and/or the body frame 12 and pivotably coupled at the
opposite end to the head 74. Accordingly, depending on the location that the opposite
end portions of the neck control rod 80 are coupled to these structures and their
respective pivot points 82 and 84, the characteristics of the head motion with respect to
15 the neck 72 and the body plate 14 will vary. Preferably, the shape of the neck cam 76
as well as the location of the neck control rod 80 will be provided such that the head
and neck cooperate in a fluid and natural forward and rearward motion with respect to
the body frame 14 and further cooperate with the appendages 16, 16', 46 and 46' to
20 facilitate the fluid and natural movement of the animated figure 10 as a whole.

In the drawings and in the specification, there have been set forth preferred
embodiments of the invention; and although specific items are employed, these are
used in a generic and descriptive sense only and not for purposes of limitation.
Changes in the form and proportion of parts, as well as substitution of equivalents, are

contemplated as circumstances may suggest or render expedient without departing
from the spirit or scope of the invention as further defined in the following claims.

Thus it can be seen that the invention accomplishes at least all of its stated
objectives.